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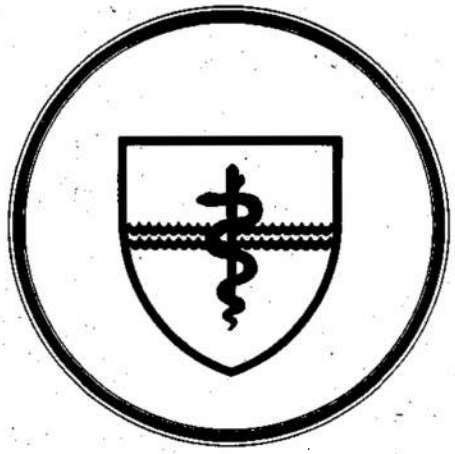

REPORT NUMBER 969

USE OF CONTACT LENSES FOR COLD WEATHER ACTIVITIES:

Results of a Survey

by

James F. Socks, CDR, MSC, USN

Naval Medical Research and Development Command
Research Work Unit M0095-PN.001-1040

Released by:

W. C. MILROY, CAPT, MC, USN
Commanding Officer
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17 December 1981

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SUMMARY PAGE

THE PROBLEM

Little is known about the relationship between the effects of cold on the cornea and the ability to wear contact lenses. Is it safe for military personnel operating in cold environments to wear contact lenses and what problems might be expected?

FINDINGS

A survey of 105 civilians who wear contact lenses for cold weather activities such as skiing and winter camping revealed few problems in wearing hard or soft contact lenses in the cold. Many reported the lenses to be comfortable and preferred them over glasses. Lens care and handling were cited as problems.

APPLICATION

Contact lenses offer some advantages over spectacles for military personnel: they do not fog nor become brittle and break in the cold, and they offer protection from wind-driven ice and snow. The problems noted in the survey must be explored before military personnel can be authorized to wear contact lenses on extended operations.

ADMINISTRATIVE INFORMATION

This research was conducted as part of the Naval Medical Research and Development Command Work Unit M0095-PN.001-1040 - "Protective devices for the eye in cold weather." It was submitted for review on 8 Dec 1981, approved for publication on 17 Dec 1981, and designated as NSMRL Report No. 969.

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ABSTRACT

Military personnel are stationed in a wide range of geographical locations, some with adverse climates. Little is known about the effects of extreme cold on the cornea and on the ability to wear contact lenses. A survey was taken of contact lens wearers who commonly wear their lenses while engaged in outdoor activities. Although no serious problems were reported, redness of the eyes was the most common complaint of hard lens wearers; soft lens wearers most frequently complained about decreased vision. Contact lenses were generally comfortable in the cold, but lens care is difficult. Since they do not fog and they offer protection from wind-driven ice and snow, contact lenses offer an important advantage over spectacles.

It is estimated that 50.3% of all Americans wear glasses[1] and there are approximately 12 million contact lens wearers in the United States.[2] Rengstorff has determined that 35.7% of the Army recruits wear glasses and 2.4% of them wear contact lenses.[3] In a survey of 47,540 Navy and Marine Corps recruits, Socks found 30% wearing glasses.[4] Since contact lenses are not specifically prohibited in the Navy and Marine Corps, they are worn by personnel engaged in occupations ranging from aviation to diving. Therefore, it is inevitable that many contact lens wearers will be stationed in geographical locations having adverse weather conditions. The two most extreme conditions would be hot, dry, windy, desert-like climates and cold winter climates. While the effects of the former can be predicted (drying of contact lenses, dust in the eyes, and resulting ocular irritation), the impact of an extremely cold climate is not as obvious.

Contact lenses can provide protection to the eye under conditions of wind-driven ice and snow.[5] In addition, Socks, in a study of the effects of extreme cold on the rabbit cornea, found no detrimental effects of wearing hard contact lenses for short durations.[6] General information, however, is not available regarding the hazards of contact lens use under extreme cold conditions. Military personnel are routinely exposed to very low wind-chill temperatures when assigned to units in the higher latitudes of North America or patrolling the North Atlantic. The survey was conducted to obtain information about the use of contact lenses in the cold.

METHOD

Readers, mostly civilian, of outdoor magazines were asked to respond if they commonly wore contact lenses in the cold. Those who answered were mailed the questionnaire shown in Fig. 1 and asked to answer the questions and return it to the author.

RESULTS

The results of the survey are outlined in Tables I and II. One hundred and five respondents returned the survey forms although some did not answer all of the questions.

Respondents were fairly evenly divided between men and women, and between hard and soft contact lens wearers in each category. The mean ages for hard lens wearers were 35.0 years for men and 30.0 years for women, and 34.4 and 30.3 years, respectively, for soft lenses (Item 1).

Hard contact lenses were worn for an average of 12.5 years compared to 2.6 years for soft lenses. This is as expected since hard contact lenses have enjoyed a strong popularity for over 20 years; whereas soft contact lenses have only been widely used in the United States for about eight years (Item 2). Fourteen of the soft lens wearers had previously worn hard contact lenses, but it is interesting to note that two of these had switched back to hard lenses again.

Both hard and soft contact lenses were worn for an average of 14 hours per day; the equivalent of a normal active waking day (Item 4).

Respondents were asked about the

cold weather activities in which they engaged while wearing their contact lenses (Item 6). The largest number reported wearing their contact lenses for a mean of 25 days of cross-country skiing per person per year, followed by camping/hiking (20 days per year), and downhill skiing and hunting/fishing at 17 days per year each. There was a wide variation in the number of years individuals had engaged in that activity as well as the number of days per year.

Symptoms experienced while wearing contact lenses in the cold were rated on the basis of frequency of occurrence: three for continual symptoms, two for frequent, one for occasional, and zero for no occurrence. There was little difference in the degree of severity of each of the symptoms; however, for the hard lens wearers, redness of the eyes was the most common complaint with four respondents reporting it as a continual problem in the cold. Decreased vision was most often reported by soft lens wearers (Item 8).

No respondent reported suffering eye injury or disease as a result of wearing his or her contact lenses in the cold. Inability to wear contact lenses due to cold was generally not a problem. One hard and one soft lens wearer said they could not wear their contact lenses in the cold due to manual dexterity problems in handling the lenses when their hands were cold.

Most respondents felt their lenses were more comfortable in cold weather; however, low humidity frequently resulted in a feeling that the lenses were dry. This was relieved by using moisturizing or rewetting drops available for both hard and soft contact lenses. Goggles or sunglasses were worn for protection against sun and glare (a problem in snowfields) and wind, yet fogging was a frequent complaint. The most significant problem for winter campers and hikers appeared to be lens hygiene and care. Cleanliness was more difficult for the soft lens wearers. The new extended-wear contact lenses can be worn continuously including during sleep; thus eliminating the need to handle the lenses.

DISCUSSION

Collation of eight hundred ninety-four man-years experience with wearing contact lenses while participating in cold weather activities reveals no significant problems associated with wearing contact lenses in cold environments. Ocular injury is unlikely when lenses are properly fit and proper hygiene is followed. Standards of cleanliness are more difficult to follow when winter hiking and camping; body oils, insect repellents, and sunscreen lotions may coat the lenses and render them optically useless. Disinfection of soft lenses presents a serious problem for the contact lens wearer in the field since each of the two approved methods of lens disinfection are incompatible, to some extent, with winter camping or military field exercises. A source of heat is not always readily available for heat disinfection, and chemical disinfection requires carrying a supply of solutions for that purpose. These solutions should be protected from freezing since the stability of these solutions subjected to freeze/thaw cycles is not known. Lenses which are removed from the eye for

cleaning and/or storage must also be prevented from freezing since damage to the lens ultrastructure or breakage may occur.

Contact lenses would appear to offer some advantages over spectacles to those military men who require corrective lenses. Contact lenses are not susceptible to fogging, they offer protection to the eye from wind-driven ice and show, and they do not become brittle and break as spectacles may when they are cold. On the other hand, the disadvantages, mentioned above, must be weighed carefully.

ACKNOWLEDGEMENTS

The author wishes to thank Ms. Alma Ryan for collating of the data from the survey forms and for preparation of this manuscript. The author is indebted to "Backpacker" and "Sports Afield" magazines for help in locating contact lens wearers who engage in outdoor activities.

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Figure 1

Vision Survey - Experience with Contact Lenses in Cold Weather

1. Age _____ Sex _____

2. How many years have you worn (a) hard contact lenses _____
   (b) soft contact lenses _____

3. What type of lenses are you now wearing (circle) Hard Soft

4. Average number of hours worn each day _____

5. Average number of hours worn each week _____

6.

Long lasting activities in cold for which you use contact lenses		Average # hours you use your contact lenses when performing that act	Average number days/yr in cold	Average number years activity in cold
a. downhill skiing	_____	_____	_____	_____
b. cross country skiing	_____	_____	_____	_____
c. snowmobiling	_____	_____	_____	_____
d. hunting/fishing	_____	_____	_____	_____
e. occupational use (specify)	_____	_____	_____	_____
f. other (specify)	_____	_____	_____	_____

7. Do you routinely wear protective goggles over your contact lenses? Yes No
   If yes, type of goggle: _____
   color of goggle lens: _____

8. Problems with contact lenses in the cold

	Never	Occasionally	Frequent	Continual
drying	_____	_____	_____	_____
itching	_____	_____	_____	_____
redness of eyes	_____	_____	_____	_____
burning sensation	_____	_____	_____	_____
tiring of eyes	_____	_____	_____	_____
eye pain	_____	_____	_____	_____
blurred vision	_____	_____	_____	_____
other (specify:	_____	_____	_____	_____

9. Have you ever been treated for an eye injury or eye disease after wearing your contact lenses in the cold? Yes No

If yes, please describe _____

_____

_____

_____

_____

10. If you regularly wear contact lenses, have you ever been unable to wear them in the cold? (Explain) _____

_____

_____

_____

_____

11. Additional comments: _____

_____

_____

_____

_____

Please return to:

Vision Survey
Naval Submarine Medical Research Laboratory
Naval Submarine Base
Groton, CT 06349

TABLE I. Summary of Responses from Wearers of Hard Contact Lenses

Questionnaire Item Number		Sex	Number of Respondents	Mean	Range
1.	Age	Male	42	35.0	17-70
		Female	24	30.5	21-45
2.	Years Worn		64	12.5	1-22
4.	Hrs/day worn	Male	30	14.5	2-18
		Female	19	14.3	11-18

6.	Activities in cold	Number of Respondents	Days/Yr	Range	# Yrs	Range
	Downhill skiing	24	13.4	2-40	7.5	1-18
	Cross-country skiing	30	21.7	2-100	5.3	2-16
	Snowmobiling	4	13.5	2-30	4.2	2-9
	Hunting/Fishing	14	21.8	5-60	14.7	3-22
	Camping/Hiking	19	24.9	2-104	6.5	1-22
	Other(sports/occupation)	16	61.6	3-240	7.8	1-20

8.	Symptoms	Number of Respondents	Averge Severity
	Dryness	25	1.2
	Itching	23	1.0
	Redness	29	1.6
	Burning	14	1.3
	Tiring	28	1.3
	Pain	9	1.2
	Decreased vision	22	1.3

TABLE II. Summary of Responses from Wearers of Soft Contact Lenses

Questionnaire Item Number	Sex	Number of Respondents	Mean	Range
1. Age	Male	21	34.4	15-58
	Female	18	30.3	17-52
2. Years worn		37	2.6	1-8
4. Hrs/Day Worn	Male	17	15.1	11-23
	Female	15	14.0	8-24

6. Activities in cold	Number of Respondents	Days/Yr	Range	# Yrs	Range
Downhill skiing	20	29.5	2-120	7.9	1-26
Cross-country skiing	23	23.0	2-70	6.1	1-26
Snowmobiling	2	14.3	14-15	11.5	3-20
Hunting/Fishing	8	9.4	5-14	7.2	2-16
Camping/Hiking	13	13.2	3-35	3.4	1-9
Other (sports/ occupation)	9	59.6	10-136	3.6	1-10

8. Symptoms	Number of Respondents	Average Severity
Dryness	19	1.2
Itching	8	1.3
Redness	15	1.3
Burning	11	1.1
Tiring	17	1.1
Pain	5	1.0
Decreased vision	25	1.0

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Military personnel are stationed in a wide range of geographical locations, many having adverse climates. Little is known about the effects of extreme cold on the cornea and on the ability to wear contact lenses. A survey was taken of contact lens wearers who commonly wear their contacts while engaged in outdoor activities. No serious problems were reported. Redness of the eyes was the most common complaint of hard lens wearers, and soft lens wearers most frequently complained about decreased vision. Contact lenses were generally

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20 cont'd: comfortable in the cold, but lens care is difficult. Contact lenses offer an important advantage over spectacles in that they do not fog. They also offer protection from wind-driven ice and snow.